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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/381,061
Filing Date: December 06, 1999
Appellant(s): TODA ET AL.

Randall J. Knuth
For Appellant

EXAMINER'S ANSWER

MAILED
DEC 1 4 2004
GROUP 1700

This is in response to the appeal brief filed Sept. 3, 2004.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is incorrect. A correct statement of the status of the claims is as follows: The brief indicates that claim 10 is objected to rather than rejected. It is noted that the cover sheet of the final rejection (mailed Oct. 3, 2003) inadvertently listed claim 10 as objected to rather than rejected. The rejections stated in final rejection, however, included claim 10, and the cover sheet of the advisory action (mailed May 5, 2004) correctly stated the status of claim 10 as that of a rejected claim. Therefore, it is clear from the record that the status of claim 10 is that of a rejected claim.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

Applicants' specification describes an apparatus for suspending a semiconductor wafer on a cushion of gas, the gas being ejected from fine pores in a base plate that is located underneath the wafer. Applicants refer to this as floating the wafer. The invention is in the location, discharge angle and function of the various types of fine pores, and how these factors affect the floating wafer. The specification describes (and

the claims recite) four types of pores based on their intended function: (1) pores for floating the wafer, (2) pores for centering the wafer, (3) pores for rotating the wafer, and (4) "auxiliary fine suppression pores configured for suppressing vibration of the substrate when the substrate is rotated at high speeds". The specific details of these four groups of pores are illustrated in Figs. 3(a)-3(c) and described on pages 3-6 and pages 17-19 of the specification. Fig. 3(a) shows the preferred arrangement of the pores for floating. Fig. 3(c) shows the preferred arrangement of the pores for rotation. Fig. 3(b) shows both the pores for centering and applicants' auxiliary pores.

The closest prior art reference of record is Hiura (JP 59-215718), who also discloses a wafer floating apparatus having fine pores for ejecting gas. Compare Fig. 2 of Hiura to applicants' Figs. 3(a)-3(c). Hiura teaches the use of (1) pores for floating the wafer (labeled 5 in Fig. 2), (2) pores for rotation (labeled 6) and (3) positioning gas pores (labeled 4). Hiura's positioning gas pores are disclosed as having the same position, the same discharge angle and the same function as applicants' centering pores, and thus Hiura's positioning gas pores are functionally equivalent to pores for centering and can be referred to as centering pores. Hiura's floating pores, centering pores and rotation pores have the same location, discharge angle and function as applicants' centering pores and rotation pores.

Thus, applicants' main departure from Hiura is applicants' provision of a fourth group of pores, described as "auxiliary fine suppression pores configured for suppressing vibration of the substrate when the substrate is rotated at high speeds". Therefore, applicants' disclosed invention resides in providing his "auxiliary pores" in the

manner ser forth in the specification, and it is these auxiliary pores that are at issue in this appeal.

The auxiliary pores are labeled 310e in applicants' Fig. 3(b).

Applicants provide specific details of their auxiliary pores at two places in their specification:

At page 6, lines 12-21, the following is provided:

> "the auxiliary fine pores are provided on a surface of the floating unit, and further fine pores are oriented to a center of the floating unit on a circle with a larger radius as compared to that of the floating unit at an angular space of 90 degrees therebetween in the outer side from the positions of the pores for rotation, so that, when a substrate body is rotated and a rotational speed of the substrate body is raised, the substrate body is prevented from jumping out from the floating apparatus".

At page 19, lines 7-19 the following is further provided:

> "The group of auxiliary fine pores shown in Fig. 3B are provided on a surface of the floating unit 301 at positions on a circle with a radius of 40 mm in the outer side from a center of the floating unit 301 at an angular space of 90 degrees and are inclined to a center of the floating unit 301. However, a radius of the circle on which the fine pores 310e constituting the group of auxiliary fine pores is not always limited to 40 mm, and may be set to any value on the condition that the circuit is positioned in the outer side from a radius of the circuit on which the fine pores for rotation are provided. Also in Fig. 3D [sic: 3B] fine pores constituting a group of auxiliary fine pores are provided at an angular space of 90 degrees, but this angle may be set to an appropriate value."

Thus, Fig. 3B illustrates a specific embodiment in which the auxiliary pores are constituted by four pores located at 90 degree intervals on a circle with a radius of 40 mm, which is greater than the radius of the wafer to be floated. Applicants' above quoted specification, however, gives broader rules for providing the claimed auxiliary pores. The rules are that the auxiliary pores are: (1) oriented or inclined to a center of

the floating unit; (2) on a circle located on the outer side of the pores for rotation (i.e. the rotation pores 310d of applicants' Fig. 3(c) or rotation pores 6 of Hiura's Fig. 2) with respect to the center of the floating unit; and (3) located along said circle with any appropriate angular spacing.

According to applicants' specification, the purpose of the gas flowing from the auxiliary pores is to prevent the substrate body from "jumping out" of the floating apparatus when the rotation speed is increased. This is stated in two places in the specification. See page 6, lines 18-20 and the sentence bridging pages 29 and 30. The only place in applicants' specification that specifically states that the auxiliary pores are for "suppressing vibration" is in lines 9-10 of claim 1 as originally filed. It is noted that at page 15, lines 4-6 of their Brief, applicants state that "jumping out" is the same thing as "vibration suppression". This is not stated in the specification as filed.

An important question to consider is just what applicants mean when they use the word "vibration". The sentence bridging pages 25 and 26, describes how the "vibration" of interest is measured:

> "When measuring vibration of the substrate body 402, a distance from a center of the substrate to a center of the floating unit was obtained from an image taken with the video camera 404, and the value was used as a vibration width of the substrate body."

Also, on pages 8 and 9 of the specification, the following statements are found:

> "Fig. 5 is a graph showing dependency of a floating height, inclination, and vibration in the horizontal direction of a substrate body on a floating gas supply rate;"

> "Fig. 6 a graph showing dependency of a floating height, inclination, and vibration in the horizontal direction of a substrate body on a centering gas supply rate;"

> Fig. 9 is a graph showing dependency of a floating height, inclination, and vibration in the horizontal direction of a substrate body on a rotation gas supply rate".

It is noted that Fig. 5(c), Fig. 6(c) and Fig. 9(c) all illustrate graphs in which the vertical axis is labeled "Displacement of a wafer in the horizontal direction (mm)". Furthermore, at page 5, lines 5-7 and 13-16 of applicants' specification, the following two statements are found:

> "vibration of the substrate body in the horizontal direction [is] controlled to 10 mm or below by correctly adjusting a floating gas supply rate",

> "it is possible to suppress vibration of a substrate body in the horizontal direction to about 5 mm or less at a given floating height by correctly controlling a centering gas supply rate."

From the above quoted passages, it appears clear that the "vibration" that applicants refer to is actually the displacement in a horizontal direction of the center of a "substrate body" (e.g. a semiconductor wafer) away from the center of the floating unit.

Applicants' abstract also contains the following:

> "More specifically the present invention relates to a substrate body-floating apparatus capable of realizing a stable floating state with less vibration of a rotation axis and a surface of a substrate body".

The reference here to "less vibration of a rotation axis" again appears to refer to the above-identified displacement in a horizontal direction of the center of the rotating

wafer. This passage also appears to refer to "less vibration of . . . a surface of a substrate body", but applicants' specification does not explain what is meant by "vibration of . . . a surface of a substrate body".

(6) Issues

The appellant's statement of the issues in the brief is substantially correct. The changes are as follows: the last issue stated in the brief regarding the objection to claim10 is incorrect for the reasons discussed above with respect to the status of claim 10.

(7) Grouping of Claims

Appellant's brief includes a statement that claims 1 and 4-10 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

4,738,748	Kisa	4-1988
4,979,466	Nishitani	12-1990
5,174,825	White	12-1992
5,273,588	Foster	12-1993
6,001,175	Maruyama	12-1999
6,005,226	Aschner	12-1999
JP 59-215718	Hiura	12-1984
WO 98/01890	Granneman	1-1998

(10) Grounds of Rejection

The following grounds of rejection are applicable to the appealed claims:

Claims 1, 4-8 and 10 stand rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hiura (JP 59-215718).

Hiura discloses a wafer floating apparatus having fine pores for ejecting gas. Compare Fig. 2 of Hiura to applicants' Figs. 3(a)-3(c). Hiura teaches the use of (1) pores for floating the wafer (labeled 5 in Fig. 2), (2) pores for rotation (labeled 6) and (3) positioning gas pores (labeled 4). Hiura's positioning gas pores are disclosed as having the same position, the same discharge angle and the same function as applicants' centering pores, and thus Hiura's positioning gas pores are functionally equivalent to pores for centering and can be referred to as centering pores. Hiura's floating pores, centering pores and rotation pores have the same location, discharge angle and function as applicants' centering pores and rotation pores.

Applicants have argued that their alleged invention is distinguished from Hiura by the provision of a fourth group of pores, described as "auxiliary fine suppression pores configured for suppressing vibration of the substrate when the substrate is rotated at high speeds". Hiura does not specifically describe a fourth group of pores named "auxiliary fine suppression pores" in the manner that applicants do.

Applicants' auxiliary pores, as claimed and as described in the specification, do not distinguish over the fine pores taught by Hiura. First, it is noted that each group of fine pores recited in the claims is recited as "a plurality" of fine pores. The word

"plurality" is defined as "the state of being plural", and "plural" is defined as "consisting of more than one". Thus, "a plurality of fine pores" only requires the presence of two pores. Each of Hiura's three functional groups of pores includes many more than two pores. If any one group of Hiura's three functional groups of pores also meet the requirements for applicants' claimed "auxiliary pores", then the extra claimed auxiliary pores can be seen as simply being a few of the pores of one of Hiura's disclosed groups of pores. Thus, applicants' description of their auxiliary pores must be carefully compared to Hiura's description of his three functional groups of pores.

Applicants' description of their auxiliary pores can be found at page 6, lines 12-21 of the specification as follows:

> "the auxiliary fine pores are provided on a surface of the floating unit, and further fine pores are oriented to a center of the floating unit on a circle with a larger radius as compared to that of the floating unit at an angular space of 90 degrees therebetween in the outer side from the positions of the pores for rotation, so that, when a substrate body is rotated and a rotational speed of the substrate body is raised, the substrate body is prevented from jumping out from the floating apparatus".

Further description of applicants' auxiliary holes can be found at page 19, lines 7-19 of the specification as follows:

> "The group of auxiliary fine pores shown in Fig. 3B are provided on a surface of the floating unit 301 at positions on a circle with a radius of 40 mm in the outer side from a center of the floating unit 301 at an angular space of 90 degrees and are inclined to a center of the floating unit 301. However, a radius of the circle on which the fine pores 310e constituting the group of auxiliary fine pores is not always limited to 40 mm, and may be set to any value on the condition that the circuit is positioned in the outer side from a radius of the circuit on which the fine pores for rotation are provided. Also in Fig. 3D (sic: 3B) fine pores constituting a group of auxiliary fine pores are provided at an angular space of 90 degrees, but this angle may be set to an appropriate value."

Thus, applicants' rules require that their auxiliary pores are: (1) oriented or inclined to a center of the floating unit; (2) on a circle located on the outer side of the pores for rotation (i.e. the rotation pores 310d of applicants' Fig. 3(c) or rotation pores 6 of Hiura's Fig. 2) with respect to the center of the floating unit; and (3) located along said circle with any appropriate angular spacing.

It is noted, however, that Hiura's positioning pores (centering pores) (labeled 4 in Fig. 2 of Hiura) meet all the requirements for the auxiliary pores as applicants describe them in the specification. At page 9, lines 3-8 of the English translation, with reference to his Figs. 1 and 2, Hiura describes his positioning pores as follows:

> "A plurality of positioning gas spray nozzles [4] are located in a dispersed manner on a circle [4'] slightly larger than the outer periphery of the wafer [2], which is retained over the discharge port [3], with the discharge port [3] at the center and in a manner such that they are inclined toward said discharge port [3] side."

Hiura's positioning pores are (1) oriented or inclined to a center of the floating unit; (2) on a circle located on the outer side of the pores for rotation with respect to the center of the floating unit; and (3) located along said circle with an appropriate angular spacing. Thus, it can be seen that Hiura's positioning pores conform to applicants' rules for providing auxiliary pores. Hiura's positioning pores have the same location, discharge angle and function as applicants' auxiliary pores. Hiura's Fig. 2 illustrates 8 positioning pores, and they can be arbitrarily divided into two groups, with one group of Hiura's positioning pores being the "plurality of fine centering pores configured for centering the substrate body at a center of a substrate body-floating apparatus" as recited in claim 1, and the other group of Hiura's positioning pores being the "plurality of

auxiliary fine pores configured for suppressing vibration of the substrate when the substrate body is rotated at high speed". It is noted that the phrase "rotated at high speed" is a relative term, and the claims do not indicate in any way what rotation speed is considered high or low. Neither the claims nor the specification make any comparison to Hiura's rotation speed, Hiura being the closest prior art. It is noted also that Hiura's positioning gas pores are angled inward to the center of the wafer, and thus inherently force the wafer toward the center, in the same manner as applicants' auxiliary pores. Hiura's positioning pores, therefore, act to center the wafer and to reduce any horizontal displacement from the center of the floating unit. Applicants' auxiliary pores are positioned and inclined in the same manner as centering pores, and would be expected to act in the same manner, as extra centering pores that prevent the wafer from "jumping out" when extra rotating force is applied.

Even if, for argument's sake, Hiura's centering pores are not considered to anticipate the recited auxiliary pores as argued above, it at least would have been prima facie obvious to modify the disclosed invention of Hiura by experimentally determining the optimum number of inwardly directed positioning gas nozzles required to smoothly float a wafer and prevent the wafer from "jumping out" of Hiura's wafer floating apparatus. It is noted that while Hiura's Fig. 2 illustrates eight positioning nozzles, one skilled in the art would recognize that eight nozzles is merely exemplary, and that the actual number required should be determined by routine experimentation. If some of the positioning nozzles or pores were arbitrarily labeled as "auxiliary", that name alone should not render them unobvious.

Hiura also discloses the use of "flotation gas spray nozzles [5]" which read on the "fine floating pores" recited in applicants' claim 1. See Fig. 2 and page 9, lines 11-18 of the English translation. Hiura describes the floating gas nozzles as follows:

> "Next, on a concentric circle [5'] located between the circle [4'] on which the plurality of positioning gas spray nozzles [4] are arranged and the discharge port [3]. A plurality of evenly dispersed flotation gas spray nozzles [5] are provided. These flotation gas spray nozzles [5] are provided in a manner such that all of them are perpendicular to the retaining board [1] or such that all of them are inclined by a set angle toward the discharge port [3] side."

Claim 3 of Hiura also recites the flotation gas nozzles as follows:

> "3. Said infrared irradiation treatment device for semiconductor substrates of claim 1 in which said plurality of flotation gas spray nozzles are provided in a manner such that they are inclined toward said discharge port by a set angle with respect to said retaining board."

Hiura teaches that his flotation pores can be (1) oriented or inclined to a center of the floating unit; (2) on a circle located on the outer side of the pores for rotation with respect to the center of the floating unit; and (3) located along said circle with an appropriate angular spacing. Thus, it can be seen that Hiura's flotation pores conform to applicants' rules for providing auxiliary pores. Hiura's flotation pores have the same location, discharge angle and function as applicants' auxiliary pores. Hiura's Fig. 2 illustrates eight flotation pores, and they can be arbitrarily divided into two groups, with one group of Hiura's flotation pores being the "plurality of fine floating pores configured for floating the substrate body" as recited in claim 1, and the other group of Hiura's flotation pores being the "plurality of auxiliary fine pores configured for suppressing vibration of the substrate when the substrate body is rotated at high speed". As

previously noted, the phrase "rotated at high speed" is a relative term, and the claims do not indicate in any way what rotation speed is considered high or low. Neither the claims nor the specification make any comparison to Hiura's rotation speed. It is noted also that Hiura specifically claims that his flotation gas pores are angled inward to the center of the wafer, and thus inherently force the wafer toward the center, in the same manner as applicants' auxiliary pores. Hiura's flotation pores, therefore, act to center the wafer and to reduce any horizontal displacement from the center of the floating unit. When Hiura suggests that his flotation gas nozzles 5 are inclined to the center, he is implicitly teaching that the flotation nozzles can be made to be supplemental centering nozzles, or "auxiliary" centering nozzles. Hiura's flotation nozzles 5 can be inclined to the center, and thus act as centering pores. They are multifunctional in the sense that that can act as flotation pores and as centering pores. They can be considered centering pores. Applicants' auxiliary pores are positioned and inclined in the same manner as centering pores, and would be expected to act in the same manner, as extra centering pores that prevent the wafer from "jumping out" when extra rotating force is applied.

Even if, for argument's sake, Hiura's inclined flotation nozzles are not considered to anticipate the recited auxiliary pores as argued above, it at least would have been prima facie obvious to modify the disclosed invention of Hiura by experimentally determining the optimum number of inwardly directed flotation gas nozzles required to smoothly float a wafer and prevent the wafer from "jumping out" of Hiura's wafer floating apparatus. It is noted that while Hiura's Fig. 2 illustrates eight flotation nozzles, one

skilled in the art would recognize that eight nozzles is merely exemplary, and that the actual number required should be determined by routine experimentation. If some of the provided flotation nozzles or pores were arbitrarily named "auxiliary pores" (or "positioning pores", or "centering pores") that name alone should not render them unobvious.

It is noted also that applicants' specification clearly states that the fine floating pores, the fine centering pores and the fine rotating pores can be used to suppress vibration, by correctly adjusting the gas supply rate flowing through each of these groups of pores. See, for example, the following passages of the specification:

page 5, lines 5-7:

> "vibration of the substrate body in the horizontal direction [is] controlled to 10 mm or below by correctly adjusting a floating gas supply rate."

page 5, lines 13-16:

> "it is possible to suppress vibration of a substrate body in the horizontal direction to about 5 mm or less at a given floating height by correctly controlling a centering gas supply rate."

Page 6, lines 3-6:

> "By raising a rotational speed of the substrate body, vibration of a surface of a substrate body and inclination of the substrate body can be reduced."

Therefore, all of the fine floating pores, the fine centering pores and the fine rotating pores can be considered to inherently meet the claimed function of the "auxiliary fine suppression pores" of suppressing vibration. Since Hiura's floating, centering and rotating nozzles operate in the same manner as applicants' floating,

centering and rotating pores, they should also be considered to inherently meet the claimed function of the claimed "auxiliary fine suppression pores" of suppressing vibration.

Regarding claim 8, it is noted that the preamble of claim 8 recites "(a) substrate body-floating type of film forming apparatus", while Hiura does not discuss using his floating apparatus as a film forming apparatus. It is noted, however, that claim 8 does not recite any apparatus structure specifically relating to film forming. The reference to film forming in the preamble of claim 8 is a recitation of intended use, and Hiura's apparatus is inherently capable of being so used. It is well known in the art that a reactive coating gas can be used as a substitute for inert gas as the floating gas in a floating apparatus of the type disclosed by Hiura. See, for example, Aschner (6,005,226) at col. 3, lines 48-52. Therefore, Hiura's disclosed apparatus inherently includes all the apparatus structure necessary to be used according to the intended use recited in the preamble of claim 8.

The rejection of claims 1, 4-8 and 10 under 35 U.S.C. 103(a) as being unpatentable over Hiura taken in view of Kisa (4,738,748) has been removed to simplify the issues for appeal. The issues raised by this rejection are essentially the same as in the rejection over Hiura alone as stated above.

The rejection of claims 8-9 under 35 U.S.C. 103(a) as being unpatentable over Hiura in view of Kisa and in further view of Bok (4,622,918), Granneman (WO 98/01890), Aschner (6,005,226) or Maruyama (6,001,175) has been removed to simplify

the issues for appeal. The references applied in this rejection are included in the remaining rejections.

Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Granneman in view of Hiura, Kisa and Foster. Granneman (abstract) teaches that a substrate can be coated by chemical vapor deposition (CVD) by supplying a coating precursor gas while the substrate is supported by flotation gas in a substrate flotation unit. It would have been obvious to provide the flotation pores of Granneman's wafer processing apparatus in the pore arrangement disclosed by Hiura and Kisa because Hiura and Kisa teach that such a pattern of holes can successfully be used to process a semiconductor wafer. Foster is cited for his teaching that it is desirable to rotate a wafer during CVD, and therefore one skilled in the art would have recognized that the floating wafer rotation means of Hiura and Kisa was useful and desirable in a floating wafer CVD apparatus such as that of Granneman.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Granneman in view of Hiura, Kisa and Foster, and in further view of Nishitani and White, who teach the use of a gas distribution nozzle of a diameter equal to the diameter of a wafer to be coated in a CVD apparatus. It would have been obvious to use such a nozzle in the apparatus of Granneman because Nishitani and White teach that such a nozzle can successfully be used to supply coating gas to a wafer in a CVD apparatus.

Claims 7-9 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Aschner or Maruyama, who both disclose an apparatus for floating, rotating and CVD coating a wafer. The gas ejection

pores of Aschner and Maruyama inherently perform the functions of both floating and rotating the wafer. Regarding the function of suppressing vibration, it is noted that vibration can inherently be suppressed by adjusting the rate of rotation, and therefore the gas ejection pores of Aschner and Maruyama are inherently capable of performing the function of suppressing vibration.

It is noted also that claims 7-9 do not require the presence of centering pores.

The rejection of claims 7-9 under 35 U.S.C. 103(a) as being unpatentable over either Aschner or Maruyama and in further view of Kisa has been removed to further simplify the issues for appeal.

(11) Response to Argument

On page 10 of the Brief, applicants have argued:

> "None of the flotation pores, or rotation pores, centering pores inherently functions to perform vibration suppression. The specification does not as the Examiner suggests provide any basis for the inherency argument proposed by the Examiner in formulating the rejections."

This line of argument was not previously presented by applicants and is newly added in the Brief.

It is noted, however, that the specification does specifically describe all of the flotation pores, rotation pores and centering pores as functioning as vibration suppression pores. See in particular pages 5 and 6 of the specification, where the following statements are found:

> "vibration of the substrate body in the horizontal direction [is] controlled to 10 mm or below by correctly adjusting a floating gas supply rate" (page 5, lines 6-7);

"it is possible to suppress vibration of a substrate body in the horizontal direction to about 5 mm or less at a given floating height by correctly controlling a centering gas supply rate" (page 5, lines 13-16);

"By raising a rotational speed of the substrate body, vibration of a surface of a substrate body and inclination of the substrate body can be reduced" (page 6, lines 3-6).

Furthermore, pages 8 and 9 contain the following:

"Fig. 5 is a graph showing dependency of a floating height, inclination, and vibration in the horizontal direction of a substrate body on a floating gas supply rate."

"Fig. 6 is a graph showing dependency of a floating height, inclination, and vibration in the horizontal direction of a substrate body on a centering gas supply rate."

Fig. 9 is a graph showing dependency of a floating height, inclination, and vibration in the horizontal direction of a substrate body on a rotation gas supply rate".

Fig. 5(c), Fig. 6(c) and Fig. 9(c) all illustrate graphs in which the vertical axis is labeled "Displacement of a wafer in the horizontal direction (mm)".

Fig. 5(c) shows that vibration in a horizontal direction (i.e. displacement of a wafer in a horizontal direction) decreases as the floating gas supply rate increases. The data shown in Fig. 5(c) was collected with the auxiliary gas flow rate set to zero (see page 27, line 5 of the specification). Thus, the pores for supplying flotation gas do function to control the vibration of the wafer depending on the gas flow rate of floating gas and these pores inherently possess the functional property of being able to suppress vibration.

In Fig. 6(c), the x-axis is incorrectly labeled "floating gas supply rate" and should be "centering gas supply rate". Fig. 6(c) shows that vibration in a horizontal direction (i.e. displacement of a wafer in a horizontal direction) decreases as the centering gas supply rate decreases. The specification fails to clearly disclose whether any auxiliary gas was supplied for the data set of Fig. 6(c). Thus, the pores for supplying centering gas do function to control the vibration of the wafer depending on the gas flow rate of centering gas and these pores inherently possess the functional property of being able to suppress vibration.

In Fig. 9(c), the x-axis is incorrectly labeled "floating gas supply rate", and should be "rotation gas supply rate". Fig. 9(c) shows that vibration in a horizontal direction (i.e. displacement of a wafer in a horizontal direction) decreases as the rotation gas supply rate increases. The data shown in Fig. 9(c) includes an example in which the auxiliary gas flow rate set to zero (see page 30, line 15 of the specification). Thus, the pores for supplying rotation gas do function to control the vibration of the wafer depending on the gas flow rate of rotation gas and these pores inherently possess the functional property of being able to suppress vibration.

On page 17, lines 4-22 of the Brief, applicants discuss their Fig. 9 and quote from page 30, line 6 to page 31, line 9 of their specification. They underline the following statement in the specification:

> "inclination and displacement in the horizontal direction of a substrate body can be suppressed by adjusting a rotational speed of the substrate body".

Applicants' then interpret this passage as follows:

> "In view of the foregoing text it is apparent that the stated suppression refers not to vibration, but to changes in the horizontal displacement and inclination of the wafer that result from making adjustments to rotational speed via control of the rotation pore gas supply. Again, it is clear that the specification cannot support the position that the rotation pores can inherently function as vibration suppression pores."

In response to this argument, it is noted again that the passages found on pages 5, 6, 8 and 9 of applicants' specification that are quoted above clearly indicate that the specification uses the term "vibration" to mean "displacement in the horizontal direction". Consider, for example, the following statement at page 5, lines 6-7 of the specification:

> "vibration of the substrate body in the horizontal direction [is] controlled to 10 mm or below by correctly adjusting a floating gas supply rate" (page 5, lines 6-7);

Compare this statement to Fig. 5(c), in which the y-axis is labeled "displacement of a wafer in the horizontal direction [mm]". Fig. 5(c) shows the horizontal displacement as being "10 mm or below". Thus, it appears clear that when page 5, lines 6-7 of the specification refers to controlling "vibration of the substrate body in the horizontal direction" "to 10 mm or below" it is referring to Fig. 5(c), which shows displacement of a wafer in a horizontal direction as being 10 mm or below. One skilled in the art would conclude that the "displacement of a wafer in the horizontal direction [mm]" shown on the y-axis of Fig. 5(c) is the same thing as "vibration of the substrate body in the horizontal direction".

In order to evaluate the scope and meaning of the functional language "configured for suppressing vibration when a substrate body is rotated at high speed", the meaning

of the word "suppressing" must be determined. The definition of "suppress" is "to restrain from a usual course or action". Thus, in order to determine if vibration is "suppressed" by a specific arrangement of pores, one must know what "usual course or action" to use as a standard of comparison. The claims as written do not define such a standard of comparison. The claims do not include any limitation that would quantify the amount or degree of vibration, or vibration suppression, that is achieved.

Hiura and the other prior art references of record do not indicate that their wafers are vibrating excessively. Thus, one skilled in the art would assume that the vibration of Hiura's wafer is inherently "suppressed" to a level that Hiura is satisfied with.

Regarding the claim limitation of "the relative positioning and directionality of a particular pore type being unique to that particular pore type with respect to others of said pore type", it is noted that each pore provided in the apparatus of Hiura is unique in its position and directionality, and any arbitrarily assigned grouping of pores in Hiura's apparatus would likewise be unique.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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December 8, 2004

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